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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,289	12/03/2003	Armin R. Volkel	D/A3237 XERZ 2 00607	6700
27885	7590	03/29/2006	EXAMINER	
FAY, SHARPE, FAGAN, MINNICH & MCKEE, LLP 1100 SUPERIOR AVENUE, SEVENTH FLOOR CLEVELAND, OH 44114			FICK, ANTHONY D	
			ART UNIT	PAPER NUMBER
			1753	
DATE MAILED: 03/29/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/727,289	Applicant(s) VOLKEL ET AL.	
	Examiner Anthony Fick	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-8 and 10-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,2,4-7 and 15-19 is/are allowed.
- 6) ☒ Claim(s) 8 and 10-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remarks

1. Applicant has amended claims 1 through 7 and 15 through 18. These amendments have placed the claims in condition for allowance, the reasoning given in the allowable subject material section below. Applicant has amended claims 8 through 10 and necessitated new rejections described below. Applicant's arguments on claims 11 through 14 were persuasive and necessitated new ground rejections. Applicant's arguments on claims 18 through 19 were also persuasive and place those claims in condition for allowance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over McBride et al. (U.S. 6,296,752) in view of Benecke et al. (U.S. 6,149,789).

McBride discloses an apparatus for separating molecules. The apparatus has electrodes for a traveling wave protocol (column 5, paragraph 4) on a substrate containing a two-dimensional array of electrodes (column 5, paragraph 2), the electrodes can be individually controlled by an electronic switching device (column 5, paragraph 3), and the traveling wave protocol can be produced by a multiphase signal as shown in figure 10. Each electrode can be individually controlled thus a plurality of

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electrical contacts between the electrodes and the voltage controller must be present in the device of McBride. McBride further discloses the array can contain any number of shapes (column 5, paragraph 2). McBride also discloses in figure 9 a planar conductor providing a voltage potential with respect to the grid that provides a bias field.

The difference between McBride and claims 8 and 10 is McBride does not show a grid arranged in concentric circles.

Benecke teaches a device for manipulating particles utilizing traveling waves. Benecke teaches several arrangements of electrodes including a variety of concentric circle arrangements in figures 8, 9, and 10.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the concentric circle arrangement of Benecke for the point electrode grid of McBride because the arrangement allows centering and decentering of particles and is especially suited to work with living biological cells (Benecke column 7, paragraph 5). Also the configuration of the electrode grid depends on the specific application of the device and it would be obvious to one skilled in the art to choose a specific one, concentric circle arrangement, for a specific application. Because McBride and Benecke are both concerned with manipulating particles using traveling waves, one would have a reasonable expectation of success from the combination. Thus the combination meets claims 8 and 10.

4. Claims 11 through 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over McBride et al. (U.S. 6,296,752).

McBride discloses an apparatus for separating molecules. The apparatus has electrodes for a traveling wave protocol (column 5, paragraph 4) on a substrate containing a two-dimensional array of electrodes (column 5, paragraph 2), the electrodes can be individually controlled by an electronic switching device (column 5, paragraph 3), and the traveling wave protocol can be produced by a multiphase signal as shown in figure 10. Each electrode can be individually controlled thus a plurality of electrical contacts between the electrodes and the voltage controller must be present in the device of McBride. McBride further discloses separation of particles in the system by providing a fluid medium on top of the grid, then applying a control signal to the electrodes to separate the particles as shown in figure 7. McBride also discloses the separations can be carried out using distinct protocols in each separate direction (column 5, paragraph 2). Figure 7 shows the traveling waves pushing the molecule in the rows and the columns at the same time, however the arrows within the figure are only illustrative possible paths of molecules A and B. The molecules can arrive at the same endpoints in the grid by traveling across the rows and then down the columns, just the same as traveling diagonally.

McBride further discloses a two dimensional separation technique utilizing a protocol in the first direction to separate the particles, and then further using a protocol in the second direction to further separate the particles (column 4, paragraph 3). In this technique, the traveling waves would be sent in one dimension to collect the agent on the one side of the grid before the signal would be sent through the other dimension to further concentrate the sample.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to operate the electrode array grid of McBride by moving the particles first in the horizontal direction (applying control signal to the rows) and then in the vertical direction (applying control signal to the columns) because this method allows the conduction of two-dimensional separations using distinct protocols in each separation direction (column 5, paragraph 2) and mimics the typical two-dimensional electrophoresis utilized within the art and disclosed by McBride to promote separation of the species (column 4, paragraph 3). Operation of the grid in this manner also lengthens the particle path for a species, thus enhancing the separation by subjecting the particle to the separation waves for a longer length of time.

McBride discloses the separation is enhanced utilizing the two dimensions similar to the enhancement seen in 2D gel electrophoresis, thus the concentration of the agent after the second dimension separation occurs is greater than the concentration of the agent after the first dimension separation as in claim 13. Also the first dimension separation still produces a higher concentration than the original as the movement in the first direction enhances the separation of the agent as in claim 14.

Allowable Subject Matter

5. Claims 1 through 2, 4 through 7 and 15 through 19 are allowed.
6. The following is a statement of reasons for the indication of allowable subject matter: the present invention includes a device and method for separating particles utilizing traveling wave grids. Wang et al. (U.S. 6,596,143) discloses an apparatus for manipulating particles and a method to use such an apparatus. The apparatus

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comprises electrically independent branches. A first branch is a traveling wave grid with a plurality of electrodes (column 2, paragraph 3). A second branch of the apparatus is also a traveling wave grid with a plurality of electrodes (column 2, paragraph 3). Also shown in figures 3A, 3B, and 4, the branches each contain a plurality of buses providing electrical communication with the plurality of electrodes. The sets of electrodes are preferably disposed on separate substrates (column 3, last paragraph), thus the grids are the first and second traveling wave grids of the present invention. Wang also discloses separation can be done on particles suspended in a fluid (column 8, last paragraph) and the separation can be accomplished in continuous or a batch mode where the suspension fluid is in contact with both sets of electrodes (column 24, paragraph 2). Wang further discloses a controller sends multi phase voltages to the electrodes through the plurality of buses (column 3, first paragraph). Figures 14A, 14B, 15A, 15B, 15C and 17B all show the agent migrating through the fluid medium partially across the first traveling wave grid in a direction perpendicular to the electrodes and then further migrating partially across the second traveling wave grid in a perpendicular direction to the electrodes. However the traveling wave grids are contained within the same plane and the planes of the grids are oriented at an angle of 0 degrees from each other instead of the 10 to 170 as required by the present invention. There is also no motivation to alter this orientation of the planes as the devices in the art typically utilize multiple grids on the same substrate or directly across from each other in a channel, both scenarios having 0 degrees of orientation angle between the grids. Thus claim 1 and its dependent claims 2 and 4 are allowable. The method of claim 5 also requires an

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angle between the planes of the grids and is thus allowable for the same reasoning as above. Claims 6 and 7 depend from claim 5 and are allowable as well.

The invention of claim 15 requires a traveling wave grid on top of a filter to transport collected agents to a detector placed in proximity to the traveling wave grid. Yamanishi (U.S. 6,949,355) discloses a method for separating cells from fluid samples. Within this method, a filtration chamber is utilized to precisely separate particles based on their sizes (column 20, paragraph 3). This filter element collects agents dispersed in a fluid medium having a size greater than the pass-through size limit of the filter element. Yamanishi also discloses attaching a microelectrode grid onto the filter, arranged in such a way so that traveling wave dielectrophoresis can cause the sample components to move on the filter surface (column 20, paragraph 5). The voltage controller for these electrodes provides a multi-phase signal to the electrodes to produce the traveling wave (column 23, paragraph 5). Yamanishi only discloses a detector for determining the volume of fluid in the sample and the traveling wave grid is utilized to clean the surface of the filter to prevent blockages. Thus the filter prevents unwanted particles from getting through and it would not be obvious to add a detector and transport these unwanted particles to this detector. Therefore claim 15 is allowable as there is no motivation to detect the particles cleaned off the filter by the traveling wave grids within the art. Claims 16 and 17 depend from 15 and are allowable for the same reasoning. Claims 18 and 19 are methods of detecting agents utilizing the system of claim 15 and are allowable for the same reasoning.

Response to Arguments

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7. Applicant's arguments, see applicant's amendments/remarks, filed January 5 2006, with respect to claims 1, 2, 4 through 7 and 15 through 19 have been fully considered and are persuasive. The rejections of claims 1, 2, 4 through 7 and 15 through 19 have been withdrawn.

8. Applicant's arguments, see applicant's amendments/remarks, filed January 5 2006, with respect to the rejection(s) of claim(s) 8 through 14 under U.S.C. 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of McBride and McBride in view of Benecke. For further description, see rejections above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Fick whose telephone number is (571) 272-6393. The examiner can normally be reached on Monday thru Friday 8 AM to 5 PM.

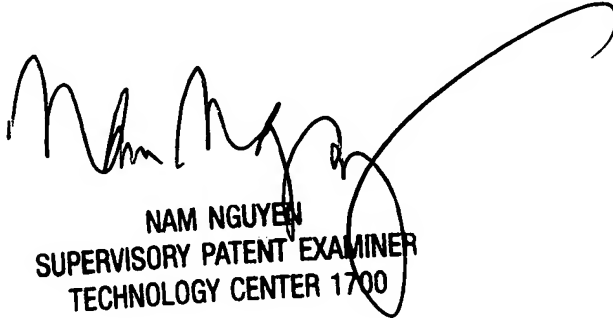
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anthony Fick
AU 1753
March 22, 2006

ADF



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